

Application No. 09/762,153

AMENDMENTS TO THE CLAIMS

A detailed listing of all claims that are, or were, in the present application, irrespective of whether the claim(s) remains under examination in the application are presented below. The claims are presented in ascending order and each includes one status identifier. Those claims not cancelled or withdrawn but amended by the current amendment utilize the following notations for amendment: 1) deleted matter is shown by strikethrough for six or more characters and double brackets for five or less characters; and 2) added matter is shown by underlining.

Please cancel claim 80.

Please amend claims 53, 57, 67-68, 71-75, 77, 81-88, 90-95 and 98, and please add new claim 113 as follows:

53. (Currently amended) A driving apparatus for driving a driven device, comprising:

a motor including a rotating shaft;

an output unit coupled to the motor, wherein the output unit includes a decelerating mechanism for transmitting rotation of the rotating shaft, after decelerating, to the driven device, and wherein the decelerating mechanism is a worm gear mechanism including a worm shaft separated from the rotating shaft and a worm wheel meshed with the worm shaft; and

a clutch located between the rotating shaft and the worm shaft, wherein the clutch allows transmission of rotation from the rotating shaft to the worm shaft and blocks transmission of rotation from the worm shaft to the rotating shaft, wherein the clutch includes:

a driving rotor coupled to the rotating shaft for rotation integral therewith;

a driven rotor coupled to the worm shaft for rotation integral therewith, wherein the driven rotor is operatively coupled to the driving rotor;

a spherical member located between the driven rotor and the driving rotor to prevent the driven rotor from being pressed against the driving rotor in the axial direction of the driven rotor; and

a lock member for selectively allowing and blocking the rotation of the driven rotor, wherein the lock member comprises a plurality of rolling bodies for circulating

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about an axial center of the driving rotor to the accompaniment of rotation of the driving rotor; ~~and~~

~~a support member for supporting the rolling bodies to hold a relative positional relationship of the rolling bodies.~~

54. (Previously presented) The driving apparatus according to claim 53, wherein the clutch includes a compensating mechanism for compensating the misalignment between the rotating shaft and the worm shaft.

55. (Previously presented) The driving apparatus according to claim 53, wherein the clutch functions to block a movement of the decelerating mechanism based on force applied to the driven device.

56. (Previously presented) The driving apparatus according to claim 53, wherein the output unit comprises a unit housing for accommodating the worm gear mechanism, wherein the clutch comprises a clutch housing for accommodating at least the driven rotor and the lock member, wherein the clutch housing is fixed to the unit housing such that the clutch housing does not rotate relative to the unit housing.

57. (Currently amended) The driving apparatus according to claim 56, wherein the clutch includes a compensating mechanism, wherein the compensating mechanism allows the driving rotor to move in the radial direction relative to the clutch housing, thereby compensating the misalignment between the rotating shaft and the worm shaft.

58. (Previously presented) The driving apparatus according to claim 53, wherein the output unit comprises a unit housing for accommodating the worm gear mechanism, wherein the motor comprises:

a motor housing for supporting the rotating shaft;

a commutator fixed on the rotating shaft;

a brush holder located between the motor housing and the unit housing; and

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a brush attached to the brush holder such that the brush is in contact with the commutator, wherein the brush holder is located between the clutch and the brush to separate the clutch from the brush.

59. (Previously presented) The driving apparatus according to claim 58, wherein the motor housing has an open end into which the brush holder is fitted.

60. (Previously presented) The driving apparatus according to claim 58, wherein the clutch comprises a clutch housing for accommodating the driving rotor, the driven rotor and the lock member, wherein the clutch housing is fixed to the brush holder such that the clutch housing does not rotate relative to the brush holder.

61. (Previously presented) The driving apparatus according to claim 56, wherein the lock member is located between the driven rotor and the clutch housing to be selectively held between and released from the driven rotor and the clutch housing, wherein, when the lock member is held between the driven rotor and the clutch housing, the lock member blocks rotation of the driven rotor relative to the clutch housing, and wherein, when the lock member is released from the driven rotor and the clutch housing, the lock member allows rotation of the driven rotor relative to the clutch housing.

62. (Previously presented) The driving apparatus according to claim 56, wherein the lock member is located between the driven rotor and the clutch housing to be selectively held between and released from the driven rotor and the clutch housing, wherein, when the lock member is held between the driven rotor and the clutch housing, the clutch blocks transmission of rotation from the worm shaft to the rotating shaft, and wherein, when the lock member is released from the driven rotor and the clutch housing, the clutch allows transmission of rotation from the rotating shaft to the worm shaft.

63. (Previously presented) The driving apparatus according to claim 56, wherein the driven rotor is formed integrally with the worm shaft.

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64. (Previously presented) The driving apparatus according to claim 56, wherein a bearing for supporting the rotating shaft is attached to the clutch housing.

65-66 (Canceled)

67. (Currently amended) The driving apparatus according to claim 71 ~~[[53]]~~, wherein a bearing for supporting the rotating shaft is arranged integral with the support member.

68. (Currently amended) The driving apparatus according to claim 71 ~~[[53]]~~, wherein a ~~[[the]]~~ bearing for supporting the worm shaft is arranged integral with the support member.

69. (Previously presented) The driving apparatus according to claim 56, wherein the clutch housing accommodates the driving rotor, the driven rotor and the lock member so that the clutch is assembled as a single unit.

70. (Previously presented) The driving apparatus according to claim 53, wherein the driving rotor is made of a resin material, and the driven rotor is made of a metal material.

71. (Currently amended) The driving apparatus according to claim 53, ~~wherein a spherical member is located between the driven rotor and the driving rotor to prevent the driven rotor from being pressed against the driving rotor in the axial direction of the driven rotor wherein the clutch includes a support member for supporting the rolling bodies to hold a relative positional relationship of the rolling bodies.~~

72. (Currently amended) A driving apparatus for driving a driven device, comprising:
a motor including a rotating shaft;
an output unit coupled to the motor, wherein the output unit includes a decelerating mechanism for transmitting rotation of the rotating shaft, after decelerating, to the driven device,
and wherein the decelerating mechanism is a worm gear mechanism including a worm shaft separated from the rotating shaft and a worm wheel meshed with the worm shaft; and

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a clutch located between the rotating shaft and the worm shaft, wherein the clutch allows transmission of rotation from the rotating shaft to the worm shaft and blocks transmission of rotation from the worm shaft to the rotating shaft, wherein the clutch includes:

a driving rotor coupled to the rotating shaft for rotation integral therewith;

a driven rotor coupled to the worm shaft for rotation integral therewith, wherein the driven rotor is operatively coupled to the driving rotor; and

a lock member for selectively allowing and blocking the rotation of the driven rotor, wherein the lock member comprises a plurality of rolling bodies for circulating about an axial center of the driving rotor to the accompaniment of rotation of the driving rotor,

~~The driving apparatus according to claim 53,~~ wherein the driven rotor contacts an end face of the rotating shaft through a ball in the axial direction of the driven rotor, and the driven rotor can directly contact the driving rotor in the rotating direction of the driven rotor.

73. (Currently amended) A driving apparatus for driving a driven device, comprising:

a motor including a rotating shaft;

an output unit coupled to the motor, wherein the output unit includes a decelerating mechanism for transmitting rotation of the rotating shaft, after decelerating, to the driven device, and wherein the decelerating mechanism is a worm gear mechanism including a worm shaft separated from the rotating shaft and a worm wheel meshed with the worm shaft; and

a clutch located between the rotating shaft and the worm shaft, wherein the clutch allows transmission of rotation from the rotating shaft to the worm shaft and blocks transmission of rotation from the worm shaft to the rotating shaft, wherein the clutch includes:

a driving rotor coupled to the rotating shaft for rotation integral therewith;

a driven rotor coupled to the worm shaft for rotation integral therewith, wherein the driven rotor is operatively coupled to the driving rotor; and

a lock member for selectively allowing and blocking the rotation of the driven rotor, wherein the lock member comprises a plurality of rolling bodies for circulating

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about an axial center of the driving rotor to the accompaniment of rotation of the driving rotor,

~~The driving apparatus according to claim 53, wherein the driven rotor has a hemispherical protrusion, the driven rotor contacts an end face of the rotating shaft through the hemispherical protrusion in the axial direction of the driven rotor, and the driven rotor can directly contact the driving rotor in the rotating direction of the driven rotor.~~

74. (Currently amended) The driving apparatus according to claim 53, wherein the spherical member is a ball that is received by the driving rotor, and the driven rotor contacts the ball in the axial direction of the driven rotor.

75. (Currently amended) A driving apparatus for driving a driven device, comprising:
a motor including a rotating shaft;

an output unit coupled to the motor, wherein the output unit includes a decelerating mechanism for transmitting rotation of the rotating shaft, after decelerating, to the driven device, and wherein the decelerating mechanism is a worm gear mechanism including a worm shaft separated from the rotating shaft and a worm wheel meshed with the worm shaft;

a clutch located between the rotating shaft and the worm shaft, wherein the clutch allows transmission of rotation from the rotating shaft to the worm shaft and blocks transmission of rotation from the worm shaft to the rotating shaft; and

~~The driving apparatus according to claim 53, wherein a ball [[is]] located between an end face of the rotating shaft and the clutch.~~

76. (Previously presented) The driving apparatus according to claim 53, wherein the driven device is a lifting mechanism for moving up and down a windowpane.

77. (Currently amended) A driving apparatus for driving a driven device, comprising:
a motor, wherein the motor includes:
a rotating shaft;

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a motor housing for supporting the rotating shaft, wherein the motor housing has an open end;

a commutator fixed on the rotating shaft and located in the motor housing;

a brush holder fitted into the open end of the motor housing to define a first space in the motor housing, wherein the commutator is located in the first space, and wherein the brush holder has a through hole through which the rotating shaft extends; and

a brush attached to the brush holder, wherein the brush is located in the first space and is in contact with the commutator;

an output unit coupled to the motor and facing the brush holder, wherein the output unit includes a decelerating mechanism and a unit housing for accommodating the decelerating mechanism, wherein the decelerating mechanism transmits rotation of the rotating shaft, after decelerating, to the driven device, and wherein the decelerating mechanism is a worm gear mechanism including a worm shaft separated from the rotating shaft and a worm wheel meshed with the worm shaft, wherein a second space is defined between the unit housing and the brush holder; and

a clutch, which is located in the second space and between the rotating shaft and the worm shaft, wherein the clutch allows transmission of rotation from the rotating shaft to the worm shaft and blocks transmission of rotation from the worm shaft to the rotating shaft, wherein the clutch includes:

a driving rotor coupled to the rotating shaft for rotation integral therewith;

a driven rotor coupled to the worm shaft for rotation integral therewith, wherein the driven rotor is operatively coupled to the driving rotor;

a lock member for selectively allowing and blocking the rotation of the driven rotor, wherein the lock member comprises a plurality of rolling bodies for circulating about an axial center of the driving rotor to the accompaniment of rotation of the driving rotor; and

a clutch housing for accommodating at least the driven rotor and the lock member,

wherein the brush holder is located between the first and second spaces to separate the first space from the second space, and wherein the brush holder supports the rotating shaft with a bearing so that the bearing shuts a space between the rotating shaft and a wall of the through hole.

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78. (Canceled)

79. (Previously presented) The driving apparatus according to claim 77, wherein the clutch functions to block a movement of the decelerating mechanism based on force applied to the driven device.

80. (Canceled)

81. (Currently amended) The driving apparatus according to claim 77 [[80]], wherein the clutch housing is fixed to the unit housing such that the clutch housing does not rotate relative to the unit housing.

82. (Currently amended) The driving apparatus according to claim 77 [[80]], wherein the clutch housing is fixed to the brush holder such that the clutch housing does not rotate relative to the brush holder.

83. (Currently amended) The driving apparatus according to claim 77 [[80]], wherein the lock member is located between the driven rotor and the clutch housing to be selectively held between and released from the driven rotor and the clutch housing, wherein, when the lock member is held between the driven rotor and the clutch housing, the lock member blocks rotation of the driven rotor relative to the clutch housing, and wherein, when the lock member is released from the driven rotor and the clutch housing, the lock member allows rotation of the driven rotor relative to the clutch housing.

84. (Currently amended) The driving apparatus according to claim 77 [[80]], wherein the lock member is located between the driven rotor and the clutch housing to be selectively held between and released from the driven rotor and the clutch housing, wherein, when the lock member is held between the driven rotor and the clutch housing, the clutch blocks transmission of rotation from the worm shaft to the rotating shaft, and wherein, when the lock member is

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released from the driven rotor and the clutch housing, the clutch allows transmission of rotation from the rotating shaft to the worm shaft.

85. (Currently amended) The driving apparatus according to claim 77 [[80]], wherein the driven rotor is formed integrally with the worm shaft.

86. (Currently amended) The driving apparatus according to claim 77 [[80]], wherein a bearing for supporting the rotating shaft is attached to the clutch housing.

87. (Currently amended) The driving apparatus according to claim 80, ~~wherein the lock member comprises a plurality of rolling bodies for circulating about an axial center of the driving rotor to the accompaniment of rotation of the driving rotor~~ 77, wherein a spherical member located between the driven rotor and the driving rotor to prevent the driven rotor from being pressed against the driving rotor in the axial direction of the driven rotor.

88. (Currently amended) The driving apparatus according to claim 77 [[87]], wherein the clutch comprises a support member for supporting the rolling bodies to hold a relative positional relationship of the rolling bodies.

89. (Previously presented) The driving apparatus according to claim 88, wherein a bearing for supporting the rotating shaft is arranged integral with the support member.

90. (Currently amended) The driving apparatus according to claim 88, wherein a [[the]] bearing for supporting the worm shaft is arranged integral with the support member.

91. (Currently amended) The driving apparatus according to claim 77 [[80]], wherein the clutch housing accommodates the driving rotor, the driven rotor and the lock member so that the clutch is assembled as a single unit.

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92. (Currently amended) The driving apparatus according to claim 77 [[80]], wherein the driving rotor is made of a resin material, and the driven rotor is made of a metal material.

93. (Currently amended) The driving apparatus according to claim 77 [[80]], wherein the driven rotor contacts an end face of the rotating shaft through a ball in the axial direction of the driven rotor, and the driven rotor can directly contact the driving rotor in the rotating direction of the driven rotor.

94. (Currently amended) The driving apparatus according to claim 77 [[80]], wherein the driven rotor has a hemispherical protrusion, the driven rotor contacts an end face of the rotating shaft through the hemispherical protrusion in the axial direction of the driven rotor, and the driven rotor can directly contact the driving rotor in the rotating direction of the driven rotor.

95. (Currently amended) The driving apparatus according to claim 77 [[80]], wherein a ball is received by the driving rotor, and the driven rotor contacts the ball in the axial direction of the driven rotor.

96. (Previously presented) The driving apparatus according to claim 77, wherein a ball is located between an end face of the rotating shaft and the clutch.

97. (Previously presented) The driving apparatus according to claim 77, wherein the driven device is a lifting mechanism for moving up and down a windowpane.

98. (Currently amended) A driving apparatus for driving a driven device, comprising:
a motor including a rotating shaft;
an output unit coupled to the motor, wherein the output unit includes a decelerating mechanism for transmitting rotation of the rotating shaft, after decelerating, to the driven device, and wherein the decelerating mechanism is a worm gear mechanism including a worm shaft separated from the rotating shaft and a worm wheel meshed with the worm shaft; and

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a clutch located between the rotating shaft and the worm shaft, wherein the clutch includes:

a driving rotor coupled to the rotating shaft for rotation integral therewith;

a driven rotor coupled to the worm shaft for rotation integral therewith, wherein, when the driving rotor rotates, the driving rotor directly contacts the driven rotor in the rotating direction of the driving rotor;

a lock member for selectively allowing and blocking the rotation of the driven rotor, wherein the lock member comprises a plurality of rolling bodies for circulating about an axial center of the driving rotor to the accompaniment of rotation of the driving rotor;

a support member for supporting the rolling bodies to hold a relative positional relationship of the rolling bodies, wherein the support member includes a ring plate and a plurality of roller supports axially extending from the ring plate to rotatably hold the rolling bodies, wherein the support member is movable relative to the driving and driven rotors; and

a clutch housing for accommodating at least the driven rotor, the lock member and the support member, wherein the lock member is located between the driven rotor and the clutch housing to be selectively held between and released from the driven rotor and the clutch housing, wherein, when the lock member is held between the driven rotor and the clutch housing, the clutch blocks transmission of rotation from the worm shaft to the rotating shaft, and wherein, when the lock member is released from the driven rotor and the clutch housing, the clutch allows transmission of rotation from the rotating shaft to the worm shaft.

99. (Canceled)

100. (Previously presented) A driving apparatus for driving a driven device, comprising:

a motor including a rotating shaft;

an output unit coupled to the motor, wherein the output unit includes a decelerating mechanism for transmitting rotation of the rotating shaft, after decelerating, to the driven device,

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wherein the decelerating mechanism is a worm gear mechanism including a worm shaft separated from the rotating shaft and a worm wheel meshed with the worm shaft; and

a clutch located between the rotating shaft and the worm shaft, wherein the clutch allows transmission of rotation from the rotating shaft to the worm shaft and blocks transmission of rotation from the worm shaft to the rotating shaft, wherein the clutch includes:

a driving rotor coupled to the rotating shaft for rotation integral therewith, wherein the driving rotor has a receiving hole;

a driven rotor coupled to the worm shaft for rotation integral therewith, the driven rotor operatively coupled to the driving rotor;

a lock member for selectively allowing and blocking the rotation of the driven rotor; and

a ball, which is received by the receiving hole and is located between an end face of the rotating shaft and the driven rotor, wherein the receiving hole opens toward an end face of the rotating shaft and toward the driven rotor so that the ball contacts the end face of the rotating shaft and the driven rotor.

101. (Previously presented) The driving apparatus according to claim 100, wherein the output unit includes a unit housing for accommodating the decelerating mechanism, wherein the clutch has a clutch housing fixed to the unit housing, and wherein an engaging mechanism is located between the unit housing and the clutch housing for blocking rotation of the clutch housing relative to the unit housing.

102. (Previously presented) The driving apparatus according to claim 100, wherein the motor includes a motor housing for supporting the rotating shaft, wherein the clutch has a clutch housing fixed to the motor housing, and wherein an engaging mechanism is located between the motor housing and the clutch housing for blocking rotation of the clutch housing relative to the motor housing.

103-104 (Canceled)

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105. (Previously presented) The driving apparatus according to claim 100, wherein the driven rotor can directly contact the driving rotor in the rotating direction of the driven rotor.

106-109 (Canceled)

110. (Previously presented) The driving apparatus according to claim 77, wherein the rotating shaft has a proximal end and a distal end, wherein the bearing is a first bearing for supporting the distal end of the rotating shaft, wherein a second bearing is located in the motor housing and supports the proximal end of the rotating shaft,

wherein the worm shaft has a proximal end and a distal end, wherein a third bearing is located in the unit housing and supports the distal end of the worm shaft, and wherein a fourth bearing is located in the unit housing and supports the proximal end of the worm shaft.

111. (Previously presented) The driving apparatus according to claim 110, wherein the clutch is located between the first bearing and the third bearing and compensates the misalignment between the distal ends of the rotating shaft and the worm shaft.

112. (Previously presented) The driving apparatus according to claim 111, wherein the clutch includes a clutch housing fixed to one of the unit housing and the brush holder.

113. (New) A driving apparatus for driving a driven device, comprising:

a motor including a rotating shaft;

an output unit coupled to the motor, wherein the output unit includes a decelerating mechanism for transmitting rotation of the rotating shaft, after decelerating, to the driven device, and a unit housing for accommodating the decelerating mechanism, and wherein the decelerating mechanism is a worm gear mechanism including a worm shaft separated from the rotating shaft and a worm wheel meshed with the worm shaft;

a clutch located between the rotating shaft and the worm shaft, wherein the clutch allows transmission of rotation from the rotating shaft to the worm shaft and blocks transmission of rotation from the worm shaft to the rotating shaft, wherein the clutch comprises:

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a driving rotor coupled to the rotating shaft for rotation integral therewith;

a driven rotor coupled to the worm shaft for rotation integral therewith, wherein the driven rotor is operatively coupled to the driving rotor;

a lock member for selectively allowing and blocking the rotation of the driven rotor, wherein the lock member comprises a plurality of rolling bodies for circulating about an axial center of the driving rotor to the accompaniment of rotation of the driving rotor; and
a clutch housing for accommodating at least the driven rotor and the lock member, wherein the clutch housing is fixed to the unit housing such that the clutch housing does not rotate relative to the unit housing; and

a compensating mechanism located between the rotating shaft and the worm shaft to compensate the misalignment between the rotating shaft and the worm shaft.